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Development of a Wet Suit for Children with Down's Syndrome

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Development of a wet suit for children with Down's syndrome

Abstract

Individuals with Down's syndrome have body types that make it difficult to fit for a wetsuit. In general their body composition includes an increase in central body adiposity and a somatotypic body type that has been described as endomorphic. An endomorphic body type is one in which the trunk predominates over the limbs. Because of these physical characteristics the administration of an aquatics exercise program, in which wetsuits are needed, can provide difficulties. We observed that it was more challenging to get these aquatic exercise participants into and out of the wetsuits that had the usual wet suit design. This article discusses a modified wet suit that is more accommodating for these individuals and allows them to enter and egress the suit without assistance. Although designed with the Down's syndrome individual in mind, this modification may be useful for those with movement restrictions or who have an increase in central body fat.

Key Words: hydrotherapy, aquatic exercise, surfing rehabilitation, disabilities

Introduction

The popularity of aquatic exercise for both fitness and rehabilitation is on the rise in the general public and for individuals in special populations (Denning, Bressel, Dolny, Bressel & Seeley, 2012). One specialized population that can benefit from aquatic exercise is those with Down's syndrome. We piloted an eight week surfing program for children with disabilities that included many with Down's syndrome (Clapham, Armitano, Lamont, & Audette, in press). This surf program is known as the University of Rhode Island's Ocean Therapy program and it is conducted and supervised by faculty and students in the Department of Kinesiology (both physical education and exercise science practitioners). The program had sixteen children (mean age = 10.8 years) who participated in surf lessons twice a week for one hour during the spring and summer months of 2012. Pre and post testing of these children using a battery of tests from the Brockport Physical Fitness Manual (Winnick & Short, 1999) determined that there was a significant improvement in strength, flexibility, and cardiorespiratory endurance over the program months. These physiological adaptations are consistent with the literature on the benefits of surfing for the disabled participant that have previously been reported (Fleischmann, et al., 2011).

Surf equipment was rented from a local surf shop and consisted of various sized surf boards and wet suits. One of the difficulties that we encountered during this program was getting the children into and out of a wet suit that was not specifically designed for their body. Children with Down's syndrome are born with a genetic predisposition to become overweight and have anthropometric differences compared to their age matched peers. Growth charts for children with Down's syndrome indicate that this tendency to be overweight begins in late infancy and continues to 18 years of age or throughout their remaining growing years (Cronk, Crocker, Pueschel, Shea, Zackai, Pickens, & Reed, 1988). Studies in adults with Down's syndrome found that their somatotype is highly endomorphic with the majority being classified as mesomorphic-endomorph (Grammatikopoulou, Manai, Tsigga, Tsiligioglou-Fachantidou, Galli-Tsinopoulou, & Zakas, 2008).

The faculty of this surf program observed that the wet suits available for the general public may be the correct length but are too small in the torso, arms and legs. On the other hand wet suits that are the proper body size are too long, and the arm and leg widths are too narrow. These generally available, but improperly sized suits made it difficult for the children to get into and out of and, therefore, a specially designed suit was field-tested during the University of Rhode Island Ocean Therapy program in 2013.

Materials and methods

The University of Rhode Island Ocean Therapy program met at a town beach in Narragansett, Rhode Island during May and June of 2012 and was popular enough to continue during the spring and summer of the following year (the spring of 2013). This exercise program was approved by the University of Rhode Island Institutional Review Board and an informed consent was obtained from parents or guardians and an assent form was signed by each child. There were 5 girls and 11 boys and the ages and clinical diagnoses of these children varied. Their ages ranged between 5 and 17 years with a mean age of 10.8 years. Because of our experience with generally available wet suits during the 2012 season, a modified suit was constructed over the winter off-season. These modified suits were then observationally tested during another eight weeks of programming in the 2013 season. Although the internet indicates that there are modified wet suits used for adapted scuba diving (“Wetsuits and watersports”, 2013), to our knowledge the following is a unique suit modification to be tested in an ocean surfing environment with the Down’s syndrome child. Figures 1 and 2 illustrate the modified suit as worn by a participant in our surfing program and this suit in comparison to a typical wet suit design.

Figure 1. Specialized wet suit on a child

Figure 2. Specialized wet suit compared with one of typical design

Steps in modifying the suit design involved measuring the Down’s syndrome children for height and then the measurement was *reduced* by two inches. Two inches was a visual estimate of the alteration needed to fit each child. Next, the body length of the suit from neck to the crotch, and the upper arm and lower arm, upper leg and lower leg were *increased* by two inches. The wrist and ankle widths, neck widths and lengths from crotch to feet were also *increased* by two inches. The wet suits were cut using a very flexible, soft 3 mm neoprene material supplied by Hyperflex Wetsuits in New Jersey (USA). Lastly, and *most importantly* long zippers were placed on both the back and the front as well as very long entry zippers on both of the arms and legs (See Figure 3). This modified wet suit design allowed the children to put themselves into and get out of the wet suit without adult assistance.

Figure 3. Wet suit opened at entry and exit zippers

Results and Conclusion

This modified suit design has entry and exit zippers that allow the suit to be put on and taken off independently and quickly. It was designed to fit the particular body type of our participants and therefore kept them warm in the cold ocean water. The long entry zippers on the back and front of the wet suit torso and the zippers placed on the arms and legs should also prove useful for those with medical diagnoses that alter mobility and effect thermal stress during exercise, such as spinal cord injury or spina bifida. It is known that spinal cord injured individuals who exercise in cold environments may experience an excessive heat loss (Janssen & Hopman, 2005). Therefore a wet suit that is easy to get into and out of and that fits well is of utmost importance to this particular surfer.

Because obesity is an issue for many with disabilities, and aquatic exercise can be of value for rehabilitation, fitness, and weight loss this modified wet suit design may be of value to aquatic's program staff that work with other types of disabilities. In particular, the use of entry and exit zippers in the torso and the arms and legs may be of value to those with mobility issues. Lastly, there were no reported problems with skin allergies or irritation while using these suits, however, none of our children's parents or guardians reported this medical issue in their pre-participation medical history questionnaire.

Many of the children in this surf program reported that getting the specially designed wet suit allowed them greater independence. One parent wrote to us about purchasing the suit at the end of the program. She commented that the suit provided for her daughter: "is so amazing and empowering! We spend a lot of time in the water....and are heading to Maine in a few weeks. The idea of having that type of wet suit that she can easily use is AMAZING". Overall, the modified suit design was observed to be of value to the young participants in our 2013 surfing program and field testing indicated that they were both user friendly and effective. There are other surf programs for those with disabilities and this wet suit modification may prove useful for their needs. In this country, some of these disabled surf programs include: Surfers Healing, Ride-a-Wave, AmpSurf, and Just Add Water Surfing ("Ocean Healing", 2013). In Australia there is the Disabled Surfer's Association and in the United Kingdom there is Freedom Surf ("Disability Surfing, 2012). Finally, aquatics program staff may find this modified wet suit design useful for their educational or adapted swim programs.

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Photographs of this surfing project were produced by Ethan Armitano.





